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Water uptake by fresh Indonesian peat burning particles is limited by water-soluble organic matter

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S1. A brief introduction to the HTDMA setup

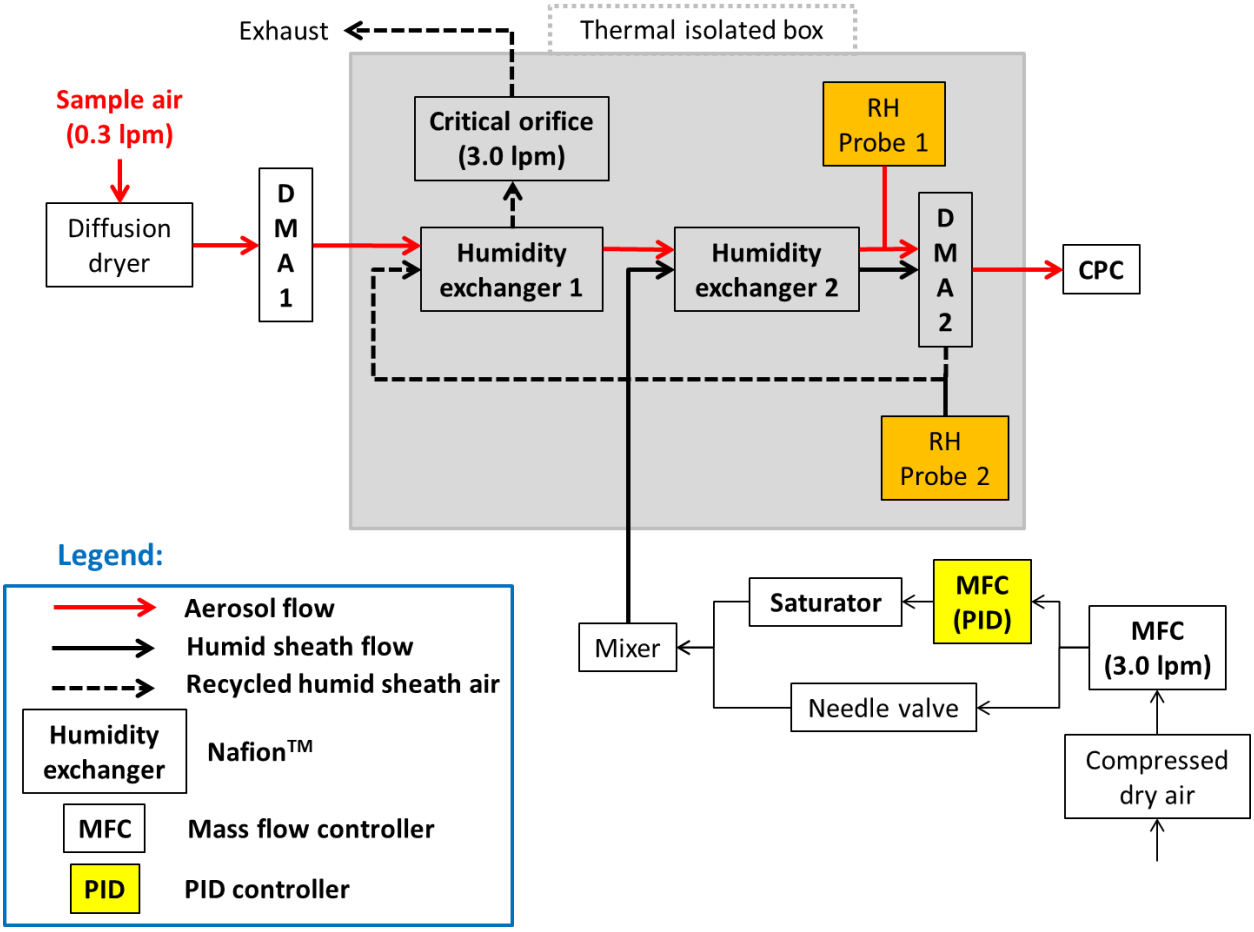

Fig.S1 Schematic diagram of the HTDMA system.

S2. RH stability in the humidified DMA (DMA2)

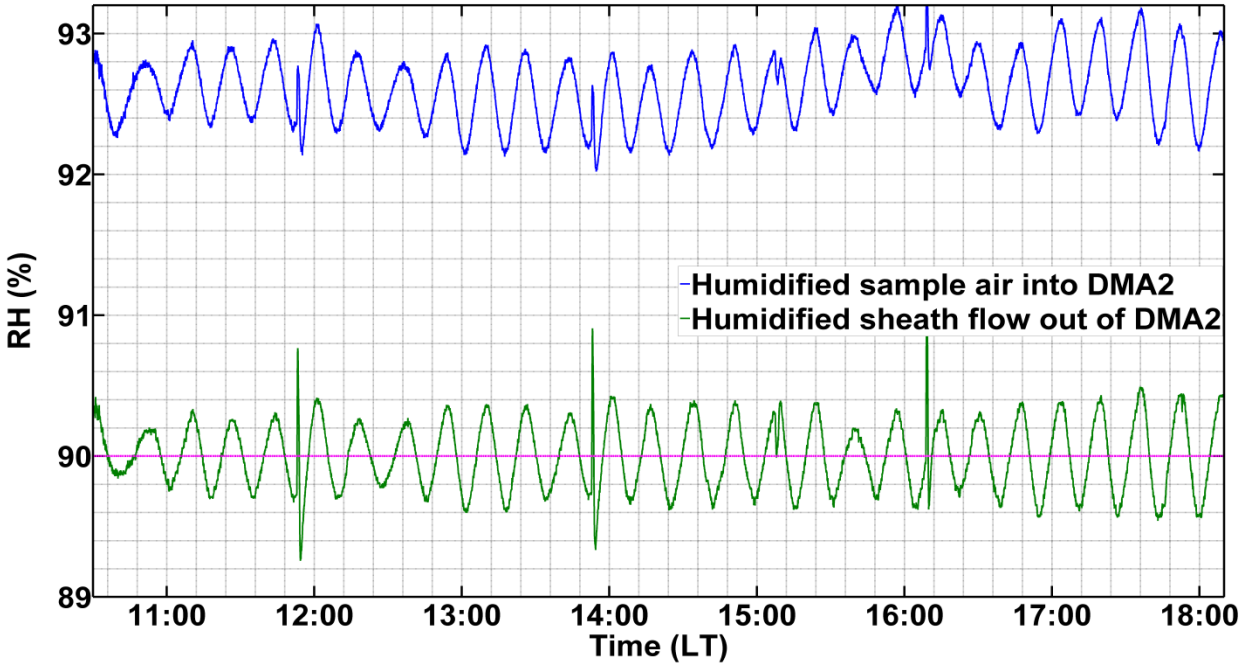

Fig.S2 RH recordings of both humidified sample air and humidified sheath flow are both fluctuating within ± 1% RH (peak-to-peak). RH of the sample flow is always higher than that of the sheath flow. The magenta line denotes the RH set point of 90%.

S3. Comparison of normalized particle number size distributions measured with the HTDMA system

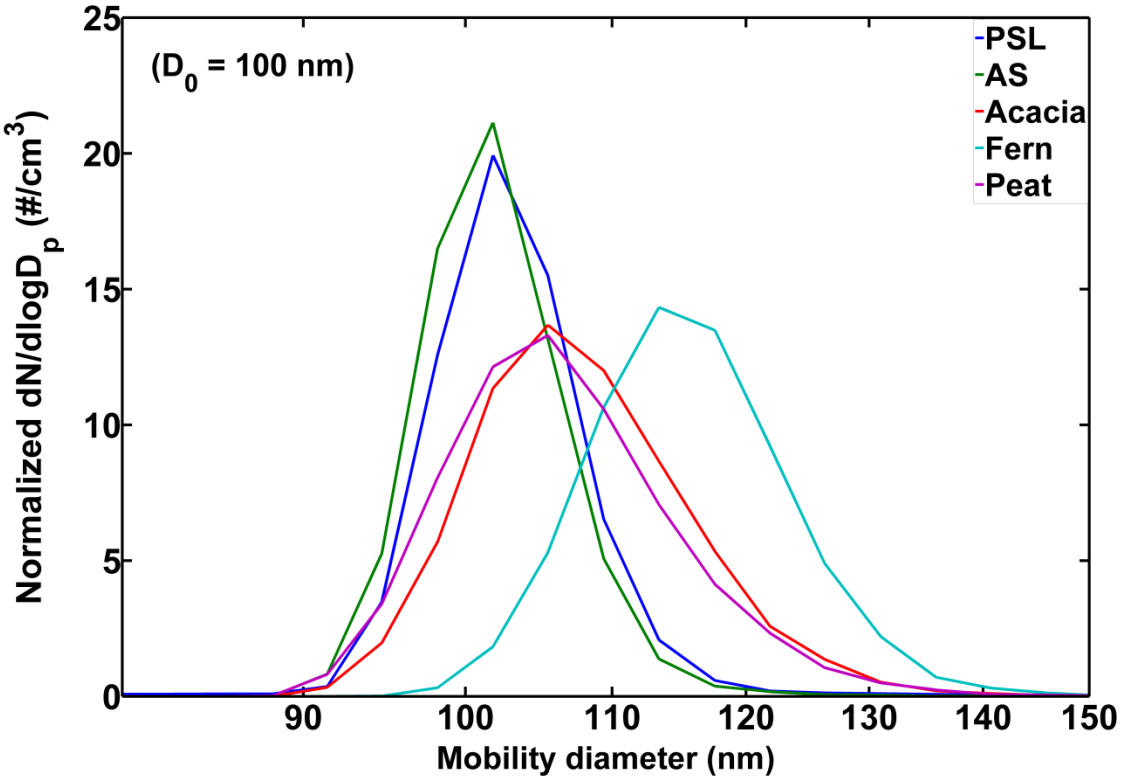

Fig.S3 Normalized particle number size distributions of 100 nm PSL and ammonium sulfate (AS) particles under dry scans (RH < 10%), and of 100 nm peat, acacia, and fern burning particles following humidification (RH = 90%) measured with the HTDMA system.

S4. ^{1}H NMR measurements

NMR samples were prepared by dissolving particles collected on a filter in either $CDCl_3$ or D_2O. $CDCl_3$ dissolves most of organic compounds, including both water soluble and insoluble species. On the other hand, only water-soluble organic species will dissolve in D_2O (Decesari et al., 2000; Graham, et al., 2002). The NMR spectra were measured using Bruker AMX-300 spectrometer at 300 MHz frequency.

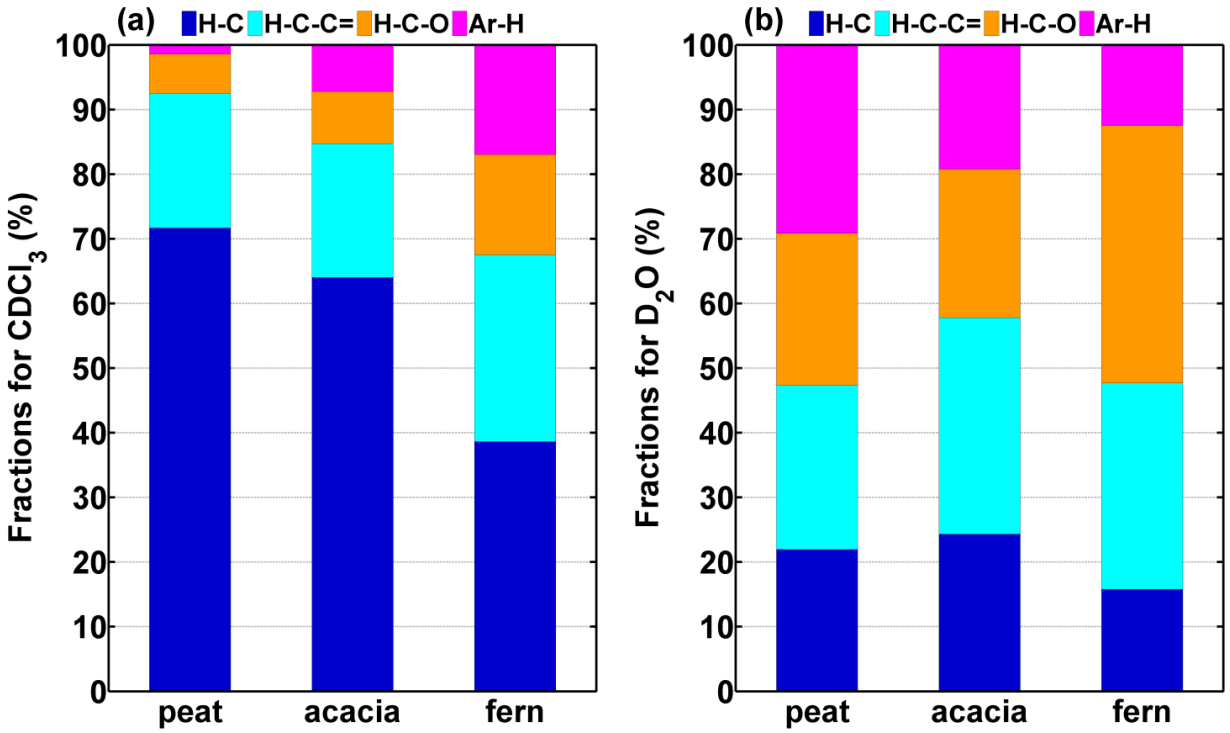

Fig.S4 Functional group analyses for peat sampled from a burnt area (Riau-1), acacia and fern burning particles with (a) $CDCl_3$ and (b) D_2O, respectively. Four major functional groups identified from ^{1}H NMR analysis indicate that aliphatic compounds containing the H-C structure are the most abundant in fresh Indonesian peat, fern and acacia burning particles, while oxygenated compounds containing the H-C-C= and H-C-O groups are more likely to dominate in water soluble organic materials. An example of the corresponding ^{1}H NMR spectra for peat burning particles dissolved in $CDCl_3$ can be found in Kuwata et al. (2017). Note that the NMR result of the peat sample in the D_2O case is only qualitative due to very weak signals were detected.

S5. Correlations between κ and OM mass spectra (mainly focusing on f_{44} and f_{60})

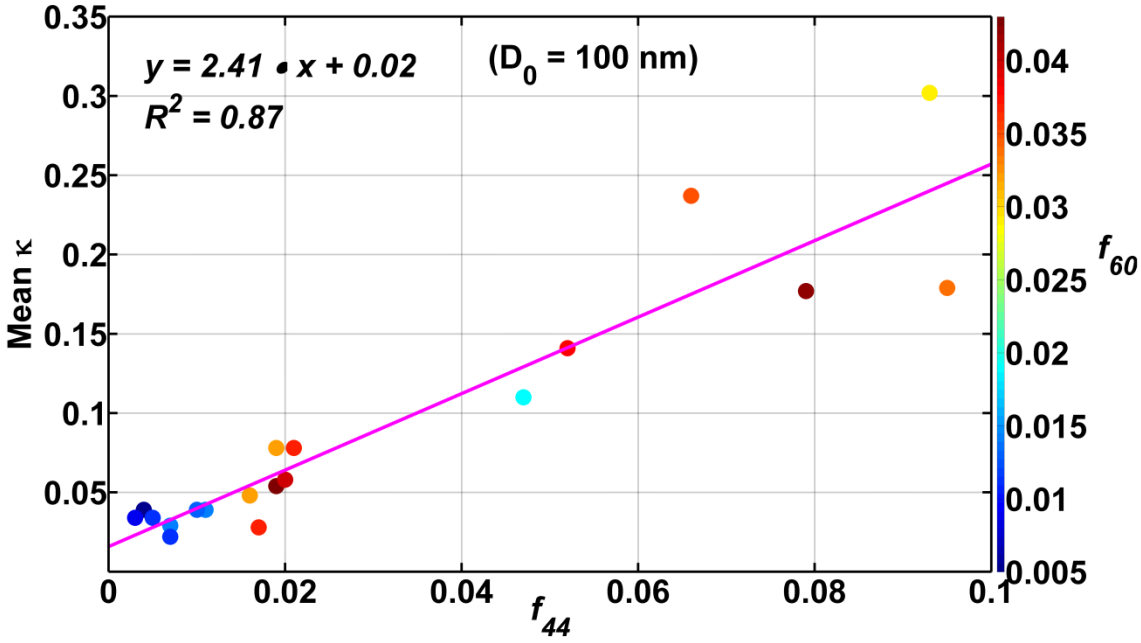

Fig.S5 Correlation of κ and f_{44} for all the online and offline measurements.

References:

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